

Iranian HEMP Is an Existential Threat

By Stephen Chill
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*Nuclear detonations miles above American soil wouldn't need to destroy cities.
They could destroy the country.*

A Dangerous Consensus

The dominant view in Washington policy circles holds Iran poses no existential threat to the United States. This consensus, however, widely held, is dangerously wrong. In 2024 and into 2025 both the International Atomic Energy Agency and the Office of the Director of National Intelligence assessed that Iran was close to having enough enriched uranium to make over ten nuclear warheads.^{[i] [ii]} The question is not whether Iran could build a weapon, but what it would do with one.

Officials and analysts who dismiss an Iranian existential threat are picturing the wrong attack entirely. They picture warheads landing on American cities, a picture requiring Iran to build, miniaturize, and deliver a substantial arsenal against the most heavily defended airspace on earth. City-killing is not the only way to destroy a country, and a nuclear weapon need not land to be catastrophic. A nuclear weapon detonated thirty to four hundred kilometers above the ground generates electromagnetic energy known as a High-altitude Electromagnetic Pulse, or HEMP, disrupting electrical infrastructure across a wide area. Ten weapons, which estimates suggest Iran had enough enriched uranium to produce, would generate a far stronger and wider field than a single detonation. HEMP at sufficient scale is an existential event for modern civilization, and it is precisely the attack vector Washington is not talking about.

It is also worth being precise about what the IAEA and ODNI assessments actually found: Iran did not possess ten nuclear warheads. It possessed the enriched uranium stockpile to produce them. That distinction matters less than it might seem. The window for preventing an Iranian nuclear arsenal is not after the weapons are assembled, it is now, before the enrichment becomes armament. The logical conclusion is that, for the United States to be secure from HEMP, Iran cannot possess nuclear weapons.

... delivery capability already exists. Multiple HEMP detonations above the US, deployed simultaneously across different regions of the country, would eliminate redundant infrastructure, and deny the United States any realistic path to reconstitution. That is what transforms a HEMP attack from a catastrophic event into an existential one. Iran has not reached that threshold but an Iran that crosses from potential to possession does not announce its intentions in advance, and the time to foreclose that possibility is before the weapons exist, not after. In this case, the enrichment threshold is very near the capability threshold.

Understanding the HEMP threat requires grasping three things: what it actually does to modern infrastructure, how completely the United States has come to depend on the systems it destroys, and why Iran is closer to executing such an attack than Washington is prepared to admit.

What HEMP Is, and Isn't

A High-altitude Electromagnetic Pulse is generated by detonating a nuclear weapon in the upper atmosphere. HEMP detonations are not low enough to level buildings, but high enough to cover an enormous swath of ground in a cascade of electromagnetic energy. In 1962, Operation Starfish Prime conducted the last U.S. atmospheric test of a HEMP weapon, detonating a 1.4-megaton device 400 kilometers above Johnston Atoll. The effects were felt on the island of Hawaii, 900 miles away.^[iii] That single data point should tell policymakers that the demonstrated impact radius of a HEMP exceeds 900 miles, sufficient to cover the vast majority of the continental United States yet the Department of Homeland Security characterizes a HEMP blast radius as only "perhaps the size of Nebraska or a bit larger"^[iv].

The HEMP pulse arrives in three distinct waves, each with different characteristics and different targets. The first wave, E1, is a nearly instantaneous surge that overwhelms solid-state electronics, frying microprocessors, control systems, and communications equipment before current protective circuits can respond. The second wave, E2, resembles a lightning strike and is more manageable, as lightning protections will mitigate most of it. The third wave, E3, is slower and more powerful. It is a longer pulse that couples into transmission lines, causing damaging current surges into the transformers that form the backbone of the electrical grid.

Just as the electrical grid induces power into household appliances, HEMP induces power into the grid itself. Most of the grid has no fundamental way to distinguish electricity from its own generators and electricity from a nuclear detonation miles overhead. Electricity follows the path of least resistance, meaning the current induced by HEMP couples with conductors and travels into grid equipment that was never built to withstand such a surge.

The debate is not whether HEMP exists, but what it does. Here is where establishment Washington retreats into minimization, as seen in the DHS policy. When the government cannot agree on what we already know happened, the claim that HEMP poses no serious threat deserves considerably more skepticism than it receives.

America's Invisible Vulnerability

The United States has become so thoroughly electrified that the loss of electricity has become more than an inconvenience. It is, in the most literal sense, a civilizational event.

Consider what runs on electricity: water treatment and distribution, food refrigeration and processing, fuel pumping, hospital life support, financial transaction systems, communications networks, and the manufacturing supply chains that produce everything else. These are the systems on which human life at modern scale depends. Planners use the term "critical infrastructure" for a reason.

Start with water. Municipal water systems depend on electrically driven pumps/machinery at every stage: intake, treatment, pressurization, and distribution. Without power, those pumps stop within hours. Humans can survive roughly three days without water, but the consequences of losing pressure begin cascading well before that threshold is reached. Hospitals cannot sterilize instruments or run dialysis machines. Firefighters cannot fight fires. The basic sanitation infrastructure that prevents epidemic disease disappears. Within days, waterborne illness becomes a mass-casualty event in its own right.

Food follows. The modern food supply chain is not a stockpile; it is a flow. For example, food inventory depends on transport, which depends on diesel fuel, which depends on electrically operated pumping stations. Without power, food spoils, resupply stops, and the just-in-time logistics model that feeds three hundred million Americans collapses in under a week.

The medical system is particularly fragile. Hospitals maintain backup generators, but those generators run on diesel, and diesel requires fuel deliveries that themselves depend on functional supply chains. Most hospital generators are designed for short-duration outages, not longer grid failures. Once those backup generators fail, patients on life support die within hours. The population facing death within days to weeks is larger than most people appreciate: the United States has approximately 2.1 million diagnosed type 1 diabetics dependent on refrigerated insulin, more than 550,000 patients on dialysis requiring continuous power and functional supply chains, and millions more dependent on refrigerated medications for conditions ranging from autoimmune disease to cancer. Combined, this population exceeds ten million Americans.^[v]

Communications collapse almost immediately. Cell towers have battery backup measured in hours, not days. Landline switching infrastructure, internet routing equipment, and satellite ground stations all require continuous power. Without communications, emergency coordination becomes impossible. Local authorities cannot reach state or federal agencies. The military cannot coordinate a response. The population cannot receive instructions. The information vacuum fills with rumor, panic, and social breakdown.

Financial systems are no less vulnerable. Electronic payment infrastructure, banking networks, automated clearing houses, and payroll systems all require continuous power and connectivity. In a sustained grid failure, the financial economy fully stops. Workers cannot be paid. Businesses cannot transact. Supply chains that survived the initial pulse freeze for economic reasons even if their physical infrastructure remained intact.

The compounding factor that most analysts underweight is restoration time. The large extra-high-voltage transformers that form the backbone of the transmission grid are custom-built, weigh hundreds of tons, and are heavily dependent on overseas manufacturing. Under normal conditions, each unit takes years to produce. The United States has no meaningful strategic reserve of these transformers. A HEMP attack that destroys even a fraction of them can produce an outage lasting months or years, and recovery is not simply slow but structurally circular: restoring the grid requires the kind of industrial activity that a functioning grid makes possible.^[vi]

This is what is meant, or should be meant, by existential threat. The nuclear destruction of three or four American cities, as monstrous as that would be, is not in itself an existential event for the United States as a functioning civilization. History records comparable catastrophes. A sustained collapse of critical infrastructure belongs to a different category altogether. It is a threat to the basic conditions of organized life for hundreds of millions of people simultaneously. In addition, it is an environment in which the U.S. military cannot effectively operate.

The Iranian Delivery Problem, Which Isn't Much of a Problem

The argument presented here rests on a premise worth stating plainly: Iran does not yet have a nuclear weapon. Skeptics will stop there, and in stopping there, will miss the point entirely. A state that is assessed to be weeks to months from weapons-grade material does not become a non-threat because it has not yet crossed the final threshold. The delivery architecture already exists. The institutional knowledge already exists. The strategic logic for using such a weapon in exactly the manner described here already exists. What does not yet exist is the warhead itself, and on the timeline that serious analysts describe, that gap is closing. When that gap closes, there is no evidence that the United States will be ready.

The standard rejoinder to HEMP threat assessments focuses on delivery: Iran's missiles cannot reach the continental United States on a conventional ballistic trajectory. This is technically accurate, and largely irrelevant to the HEMP threat. Almost two decades ago the US Senate was warned that Iran had the capability to put a nuclear warhead into the atmosphere above the United States and that their doctrine offered this type of attack as a legitimate form of warfare.^[vii] Two decades later, their capability is enhanced.

A HEMP attack does not require the precision reentry that makes true intercontinental ballistic capability so difficult to achieve. It requires no city target, no ground impact point whatsoever. It requires only that a nuclear device reach the correct altitude above a broad target area and let physics do the rest. The coverage footprint of a single HEMP detonation is vast; a weapon detonated over the central United States could degrade infrastructure across the entire country. A strike optimized for simultaneous coverage of Washington, New York, and much of the eastern seaboard is equally straightforward to arrange and could be calibrated to maximize field strength over both population centers, driving more thorough and uniform infrastructure destruction.

Most people picture a missile attack as a high-arching parabola that rises steeply, crosses over the North Pole, and descends onto a target thousands of miles away. That trajectory is what makes traditional ICBMs so demanding to develop: the warhead must survive violent reentry through the atmosphere at hypersonic speeds, and the guidance system must correct for the Coriolis effect, atmospheric drag, and a dozen other variables to place a weapon within a few hundred meters of a city target. It took the superpowers decades to master that problem. A HEMP attack requires none of it. The weapon does not reenter. It detonates in space, at altitude, above a broad target area. There is no precision guidance problem because there is no precision target. There is no reentry heating problem because the warhead never comes back down. What is required is simply this: get the weapon to the correct altitude above the correct general region of the Earth.

A missile launched from a container ship can be placed over the United States at altitude. The missile does not need to be aimed at a specific city or even a specific state. Its trajectory, determined by launch angle and velocity, places the weapon over the target region at apogee. No precision ground target is required and no reentry is needed.

The practical implication is that Iran does not need a mature ICBM program to threaten the continental United States with HEMP. A medium- or intermediate-range ballistic missile capable of reaching an altitude of 30 to 400 kilometers, combined with a nuclear warhead, is sufficient. Iran has been developing exactly that combination for years. The Shahab-3 and its derivatives already reach the required altitudes. The delivery problem that analysts cite as the reason not to worry is, for HEMP purposes, a problem Iran has largely overcome.^[viii]

Iran also has orbital launch capability.^[ix] A nuclear device placed in the correct orbit passes over the continental United States on a routine basis, invisible to conventional missile warning systems, with no ballistic trajectory to detect or intercept, and no launch signature consistent with an inbound attack. The delivery constraints that dominate conventional threat assessments do not apply to a weapon that is already overhead.

The Reckoning We Keep Avoiding

The American strategic community has known about the HEMP threat for decades. Commissions have studied it. Reports have been written. Recommendations have been made. The electrical grid, along with the broader critical infrastructure it powers, remains almost entirely unprotected.

The reasons for this are partly economic (hardening the grid is expensive), partly bureaucratic (responsibility is diffused across federal agencies and private utilities), and partly psychological. It is genuinely difficult to mobilize political will around a threat that is abstract, unfamiliar, and invisible until the moment it is catastrophically real.

The dismissal of Iranian existential threat rests on a failure of imagination, or more precisely, a failure to update the mental model of what an existential attack looks like. It does not have to look like Hiroshima. It can look like silence: no lights, no water, no fuel, no communications, no functioning economy, and no clear path back.

Before the next round of reassurances that Iran poses no existential danger, those making that argument owe the public specific answers to several questions: What is the plan in the event of a HEMP attack on the United States? Would we retaliate by striking Iranian cities? Would we respond in kind against a country with far less infrastructure to lose? Even if Iran never deployed HEMP against the United States directly, the capability alone would transform the regional calculus: a state that can neutralize its neighbors' infrastructure without a conventional invasion, and absorb or deter any response, is not a regional power. It is a regional hegemon.

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Notes:

[i] International Atomic Energy Agency, *Verification and Monitoring in the Islamic Republic of Iran in Light of United Nations Security Council Resolutions* (Vienna: IAEA, May 2025); Rafael Grossi, interview by Al Jazeera, March 2026.

[ii] Office of the Director of National Intelligence, *Annual Threat Assessment of the U.S. Intelligence Community* (Washington, DC: ODNI, November 2024); Tulsi Gabbard, testimony before the U.S. Senate, March 18, 2026.

[iii] Charles N. Vittitoe, "Did High-Altitude EMP Cause the Hawaiian Streetlight Incident?" Sandia National Laboratories, June 1989. p 22

[iv] Federal Emergency Management Agency, *Planning Guidance for Response to a Nuclear Detonation*, 3rd ed., updated June 12, 2023, 177, https://www.fema.gov/sites/default/files/documents/fema_nuc-detonation-planning-guide.pdf.

[v] Centers for Disease Control and Prevention, National Diabetes Statistics Report, Atlanta: U.S. Department of Health and Human Services, 2024, <https://www.cdc.gov/diabetes/php/data-research/index.html>; National Institute of Diabetes and Digestive and Kidney Diseases, "Kidney

Disease Statistics for the United States," last reviewed October 2025, <https://www.niddk.nih.gov/health-information/health-statistics/kidney-disease>.

[vi] Commission to Assess the Threat to the United States from Electromagnetic Pulse (EMP) Attack, Report of the Commission to Assess the Threat to the United States from Electromagnetic Pulse (EMP) Attack: Critical National Infrastructures (Washington, DC: U.S. Government Printing Office, April 2008), <https://www.loc.gov/item/2023693057>; U.S. Department of Homeland Security, National Protection and Programs Directorate, written testimony before the House Homeland Security Subcommittee on Cybersecurity, Infrastructure Protection, and Security Technologies, September 12, 2012, <https://www.dhs.gov/news/2012/09/12/written-testimony-nppd-house-homeland-security-subcommittee-cybersecurity>.

[vii] U.S. Congress, House, *Threat Posed by Electromagnetic Pulse (EMP) Attack*, Hearing before the House Armed Services Committee, 110th Cong., 2nd sess., July 10, 2008, <https://www.congress.gov/event/110th-congress/house-event/LC9504/text>

[viii] National Air and Space Intelligence Center, Ballistic and Cruise Missile Threat (Wright-Patterson Air Force Base, OH: NASIC, 2017), <https://media.defense.gov/2017/Jul/28/2001772663/-1/-1/0/2017-BALLISTIC-AND-CRUISE-MISSILE-THREAT.PDF>; Missile Defense Advocacy Alliance, "Shahab-3," <https://www.missiledefenseadvocacy.org/missile-threat-and-proliferation/todays-missile-threat/iran/shahab-3/>; Anthony H. Cordesman and Adam C. Seitz, *Iranian Weapons of Mass Destruction: Capabilities, Developments, and Strategic Uncertainties* (Washington, DC: Center for Strategic and International Studies, 2008).

[ix] Islamic Revolutionary Guard Corps Aerospace Force, official announcement of Soraya satellite launch, January 20, 2024, as reported by Press TV, <https://www.presstv.ir/Detail/2024/01/20/718559/Iran-space-launch-record-Soraya-satellite-Qaem-100-satellite-carrier>; France, Germany, and United Kingdom, Joint Statement on Iran's Soraya Satellite Launch, January 26, 2024, <https://www.gov.uk/government/news/irans-soraya-satellite-launch-e3-joint-statement>; France, Germany, and United Kingdom, Joint Letter to the United Nations Security Council Regarding the Ghaem-100 Space Launch Vehicle, November 29, 2022.

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